

REMARKS

Applicant notes with appreciation the detailed comments that the Examiner made in the Office Action in response to Applicant's previous arguments. The present amendments are responsive to the Examiner's concerns noted in the Office Action.

Allowable Subject Matter

Applicant notes with appreciation the indication of allowable subject matter in claims 20 and 27. Claims 20 and 27 have been amended to independent form, including all the limitations in the base and intervening claims. Claims 20 and 27 should now be in condition for allowance.

Prior Art Rejections

The Examiner rejected independent claim 1 as being anticipated alternatively by the following: (a) JP 60043998 to Shuji; (b) U.S. Patent No. 4,232,204 to Rojas; (c) U.S. Patent No. 4,477,699 to Wada; or (d) U.S. Patent No. 4,517,416 to Goossens. In addition, the Examiner rejected some of the dependent claims as being obvious over JP60043998 and Rojas. These rejections are respectfully traversed.

The Invention

The present invention is directed to a novel loudspeaker structure that utilizes a thin film membrane as the diaphragm to radiate sound. In the disclosed embodiment, a driver is attached

to a back plate and a sound enhancer. A frame attached to the back plate supports a thin film membrane, which is stretched under tension and attached to the frame. The membrane is attached to the frame, for example, by adhesion using a rubber type adhesive that dampens the membrane resonance. The membrane may be provided with a hole. The enhancer has a neck attached to the driver and a mouth attached to the membrane. The enhancer is movable in accordance with the movement of the driver.

Traversal of Cited Prior Art

None of the cited prior art teach or suggest the present invention. None of the cited prior art uses a thin film membrane as the diaphragm. Instead, all the cited prior art use a diaphragm of a panel type structure.

Claim 1 has been amended to recite a thin film membrane to make clear that the diaphragm in the loudspeaker of the present invention uses a thin film membrane, as opposed to a panel of material. There are clear distinctions between “thin film membrane” type diaphragm and “panel” or “plate” type diaphragm used in the cited prior art. As mentioned in the background section of the present application, a panel type diaphragm has a complex bending behavior resulting in a large number of seemingly randomized vibrational modes distributed across the panel surface. The disadvantage of this device is that the complex bending behavior of the panel requires precise manufacturing, which is costly and time consuming. In contrast, the thin film membrane diaphragm of the present invention provides a uniform surface having significantly improved acoustic response and dynamics.

Specifically, Shuji discloses the use of a plate diaphragm 12. The diaphragm 12 is a thin part of a plate that is part of the loudspeaker cabinet 11. It is clear that the plate 11 having the thin part 12 does not correspond to a thin film membrane in the context of the present invention.

Rojas uses a plate 5 made of expanded polystyrene (see, column 3, lines 29-31) as the loudspeaker diaphragm. Rojas varies the relative densities of the expanded polystyrene plate to achieve the desired audio response. Expanded polystyrene plate is not a thin film membrane.

Wada uses a diaphragm 4 having a honeycomb structure, which is not a thin film membrane.

Goossens uses a multi-layered panel diaphragm 20, comprising a polymethacrylimide foam core 23 and skin layers 24 and 25. This composite panel diaphragm 20 cannot be said to correspond to a thin film membrane.

With respect to the dependent claims, none of the cited prior art discloses a thin film membrane that is homogeneous in thickness and material (claim 5); or uniformly tensioned, and maintained taut under tension (claims 7 and 8). Applicant submits that the plate or panel type structures in the cited prior art are not stretched under tension. There is no disclosure if and how the plate, expanded polystyrene, composite and honeycomb structures can and should be stretched under tension. For example, a honeycomb structure should not be stretched under tension in the planar direction! Accordingly, none of the cited prior art render the present invention obvious.

The Examiner appeared to have relied on personal knowledge of prior art as the basis of rejecting some of the dependent claims as being obvious. (For example, the Examiner stated: "Regarding claims 6-7 and 9, Shuji does not specifically disclose the material as claimed in claims 6-7. However, it is known in the art to provide the material of the diaphragm which is

made of a flexible, substantially non-elastic, Kapton, polyimide or metal foil material.”) It appears that the Examiner is taking Official Notice of known prior art or personal knowledge of the prior art. Applicant respectfully challenges such Official Notice and personal knowledge, and requests the Examiner to provide clear documentary evidence for such prior art, pursuant to MPEP 2144.03, subparagraph C.

CONCLUSION

In view of all the foregoing, Applicant submits that the claims pending in this application are patentable over the references of record and are in condition for allowance. Such action at an early date is earnestly solicited. **The Examiner is invited to call the undersigned representative to discuss any outstanding issues that may not have been adequately addressed in this response.**

Respectfully submitted,



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Dated: September 16, 2004

Attachment: Replacement Sheets of Drawings (2)



Fig. 5

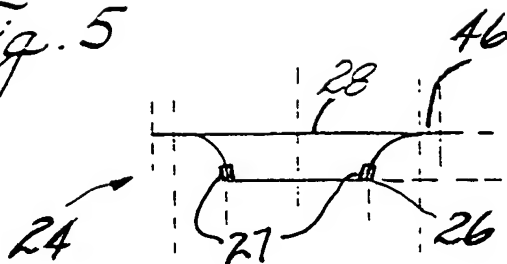


Fig. 6

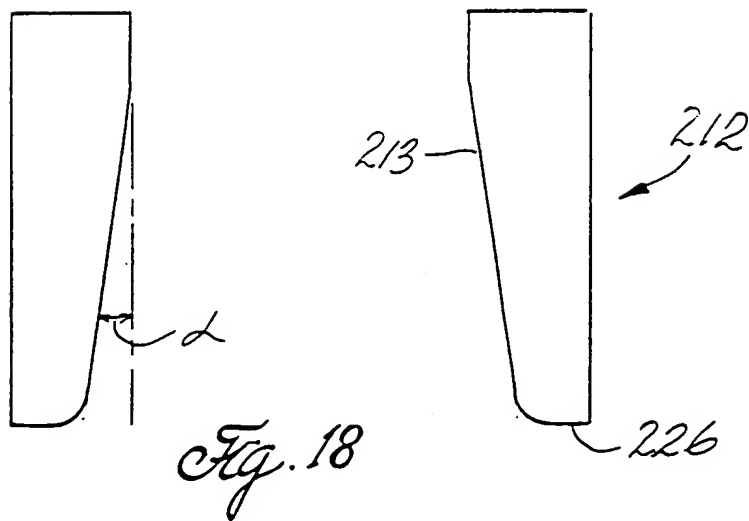
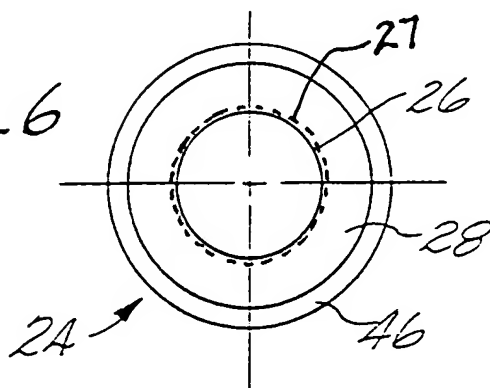




Fig. 16

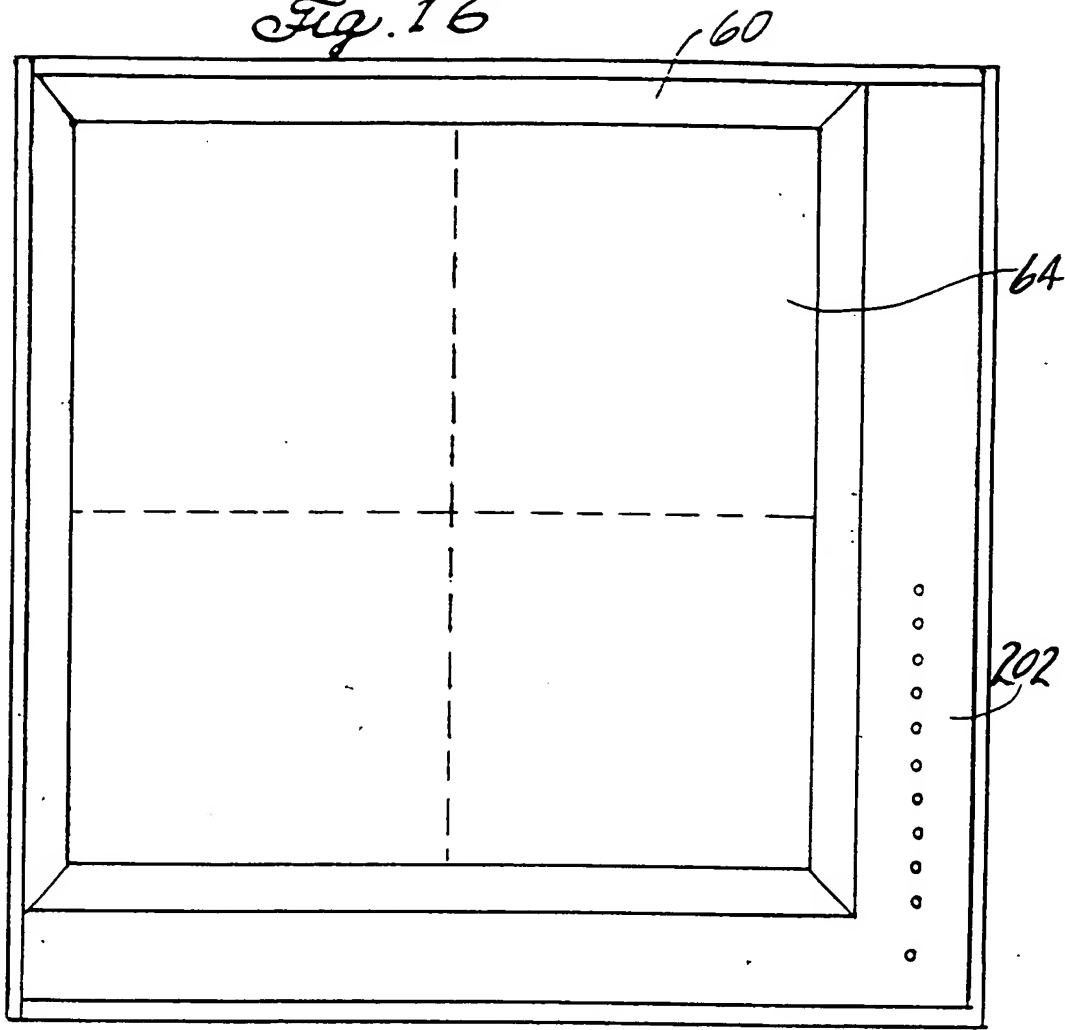


Fig. 17

